Structuring and characterizing databases of regional material flow analyses

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Complete understanding of our resource consumption and waste generation is a basis for efficient management of resource and waste flows. A national resource budget aims at increasing the understanding of a macro-scale regional material system by systematic data compilation. The results are usually of uncertain validity as the information basis is always limited and sometimes intransparent.

The assessment of a budgets validity and information content can be based on systematic characterization and analysis of applied input data, considering the specific nature of resource budget data. These are usually unstructured, cross-disciplinary, have different formats and qualities and come from heterogeneous sources, such as official trade statistics, lab measurements or assumptions.

A framework for characterization of resource budget data based on a phenomenology of MFA information has been proposed. It has been implemented in a spreadsheet tool and is here applied to the 2011 Austrian Palladium (Pd) budget. It facilitates transparent documentation of input data and a systematic assignment of meta-information and data characteristics to data elements. Some results are briefly sketched in this abstract and given in more detail in the affiliated conference presentation.

The 2011 Austrian Pd budget consists of 25 flows. 10 flows are a priori unknown. 48 information elements are compiled for the description of 30 entities (such as concentrations, ratios, quantities) to quantify the remaining 15 flows. For two thirds of the entities, the number of samples is n = 1. Mostly it is not empirical information, but information derived from assumptions or other data. More than 45% of the information is from educated guesses, 10% from expert interviews, another 10% from official statistics and 35% from scientific reports.

A systematic database examination shows that the available database for the Pd budget is very vague, compared to other budgets such as phosphorus.

The total workload for characterization and analysis of the Pd budget database has been 25 hours. It is recommended to apply the data characterization tool in parallel to the process of data collection. Further developments of the data characterization framework will allow the differentiated evaluation of data quality based on data characteristics. This can be the basis for rigorous assignment.
of data uncertainties and opens a series of possibilities to better understand resource budgets and their information content.

1 LANER et al. 2015. Applying fuzzy and probabilistic uncertainty concepts to the material flow analysis of palladium in Austria. JIE.

2 SCHWAB et al. submitted. A Data Characterization Framework for Material Flow Analysis. JIE.